In the claims:

1. (canceled)

2. (canceled)

3. (canceled)

4. (canceled)

5. (canceled)

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (canceled)

11. (canceled)

12. (currently amended) A method comprising

optimally selecting a transmit signal and a bank of receivers to maximize correct classification of any subject target of a given pool of targets;

wherein a following first equation defines the transmit signal:

$$f(t) = \sum_{k=1}^{m} \lambda_k f_k(t),$$

wherein $f(t)$ is the transmit signal, wherein m is a fixed number depending upon the number of targets;

wherein λ_k is the k-th maximum eigenvalue of a following second equation:

$$\int_0^T \Omega_M(\tau_1, \tau_2) f_k(\tau_2) d\tau_2 = \lambda_k f_k(\tau_1), \quad 0 < \tau_1 < T, \quad k = 1, 2, \ldots$$

wherein $f_k(t)$ is an eigenvector associated with the k-th largest eigenvalue λ_k of the second equation:

wherein $$\Omega_M(\tau_1,\tau_2)=\sum_{i=1}^{M}\sum_{k=1}^{M}\underbrace{\int_0^{t_0}\Delta s_{ik}(t-\tau_1)\Delta s_{ik}^*(t-\tau_2)dt}_{W_{ik}(\tau_1,\tau_2)},$$

wherein $\Delta s_{ik}(t)=s_i(t)-s_k(t)$;

wherein t is time, M=the number of targets, k is an index that ranges from 1 to M,

wherein τ_1 is a variable from 0 to t_0, τ_2 is a variable from 0 to t_0, $W_{ik}(\tau_1,\tau_2)$ is a kernal function, t_0 is the decision instant;

and a Fourier transform $S_i(\omega)$ of $s_i(t)$ satisfies:

$$S_i(\omega)=L^{-1}(j\omega)Q_i(\omega)P(\omega), i=1,2,\ldots,M;$$

wherein $L(j\omega)$ is the minimum phase whitening filter who's Fourier transform magnitude $|L(j\omega)|$ satisfies:

$$|L(j\omega)|^2=G_c(\omega)|P(\omega)|^2|F(\omega)|^2+G_n(\omega);$$

wherein $G_c(\omega)$: is a clutter spectrum;
wherein $G_n(\omega)$: is a noise spectrum;
wherein $P(\omega)$: is a fourier transform of the transmitter output filter;
wherein $F(\omega)$: is a fourier transform of $f(t)$ in first equation;
wherein $Q(\omega)$: is a fourier transform of the target waveform $q_i(t), i=1,2,\ldots,M.$;

and wherein the first and second equations are implemented iteratively.

13. (original) The method of claim 12 further comprising

selecting the bank of receivers so that each receiver of the bank of receivers minimizes any clutter signal or noise signals.

14. (original) The method of claim 12 wherein

the transmit signal is optimally selected by assuming any target in the given pool of targets may be present.

15. (original) The method of claim 12 wherein

the transmit signal and the bank of receivers are selected to minimize clutter and noise signals using the power spectra of the clutter and noise signals.

16. (currently amended) The method of claim ~~2~~ 12 further comprising

generating displays using target data with multidimensional visualization for corresponding target location.

17. (currently amended) The method of claim 16 wherein

each receiver of the bank of receivers has an input and an output;

further comprising calibrating each receiver by applying to the input of each receiver a target only input signal corresponding to a target that each receiver is designed to detect;

wherein each target only input signal simulates a situation where only a single target is present;

wherein each receiver generates an output signal at its output in response to each target only input signal so that a plurality of output signals from a corresponding plurality of outputs of a corresponding plurality of receivers are generated for each target only input signal, and

wherein the plurality of output signals form a test multidimensional vector for each target only input signal, so that there are a plurality of test multidimensional vectors ~~for a~~ corresponding to a

plurality of target only input signals.

18. (currently amended) The method of claim 17 further comprising

receiving at each input of each receiver of the bank of receivers, an actual but unknown target signal comprised of a noise signal, a clutter signal and a signal received from an actual target;

producing in response to the actual target signal an actual output signal at each output of each receiver;

wherein the output signals from all of the receivers of the bank of receivers form ~~an~~ an actual multidimensional vector.

19. The method of claim 18 further comprising

comparing the actual multidimensional vector to the plurality of test multidimensional vectors to determine which target is present.

20. (currently amended) The method of claim 18 wherein

there are a number of items in the actual multidimensional ~~display~~ vector;

and the number of items in the actual multidimensional ~~display~~ vector is the same as the number of targets in the target pool.

21. (currently amended) The method of claim 20 further comprising

displaying on a screen in two dimensional format the actual multidimensional ~~display~~ vector.

22. (currently amended) The method of claim 20 and further comprising

displaying on a screen in three dimensional format the actual multidimensional ~~display~~ vector.

23. (new) The method of claim 12 wherein

m is determined by computing the difference between the first eigenvalue λ_1 and the twenty fifth eigenvalue λ_{25}, dividing that difference by four to obtain a first result, subtracting that first result from the first eigenvalue λ_1 to obtain a second result and using an eigenvalue index corresponding to the second result for the number m.

24. (new) The method of claim 12 wherein

m is determined by computing the mid point of 0 decibels and the maximum eigen value in decibels for the first equation 14, and using the corresponding eigen value index for the number m.

25. (new) The method of claim 12 wherein

m is set to a constant.

26. (new) A method comprising:

providing a transmit signal;

modifying the transmit signal to form a modified transmit signal;

sending the modified transmit signal out towards one or more targets and towards clutter;

receiving a combination signal back from the one or more targets and from the clutter;

supplying the combination signal to a bank of filters comprised of a plurality of filters; and

wherein the bank of filters includes a filter for each of the one or more possible targets; and

wherein a following first equation defines the transmit signal:

$$f(t) = \sum_{k=1}^{m} \lambda_k f_k(t),$$

wherein $f(t)$ is the transmit signal, wherein m is a fixed number depending upon the number of targets;

λwherein λ_k is the k-th largest eigenvalue of a following second equation:

$$\int_0^T \Omega_M(\tau_1, \tau_2) f_k(\tau_2) d\tau_2 = \lambda_k f_k(\tau_1), \qquad 0 < \tau_1 < T, k = 1, 2, \ldots$$

wherein $f_k(t)$ is an eigenvector associated with the k-th largest eigenvalue λ_k of the above equation;

wherein $$\Omega_M(\tau_1, \tau_2) = \sum_{l=1}^{M} \sum_{k=1}^{M} \underbrace{\int_0^{t_0} \Delta s_{ik}(t - \tau_1) \Delta s_{ik}^*(t - \tau_2) dt}_{W_{ik}(\tau_1, \tau_2)} , ;$$

wherein $\Delta s_{ik}(t) = s_i(t) - s_k(t)$;

wherein t is time, M the number of targets, τ_1 is a variable from 0 to t_0, τ_2 is a variable from 0 to t_0, $W_{ik}(\tau_1, \tau_2)$ is a kernal function, and t_0 is the decision instant; and

wherein $W_{ik}(\tau_1, \tau_2) = \int_0^{t_0} \Delta s_{ik}(t - \tau_1) \Delta s_{ik}^*(t - \tau_2) dt$.